



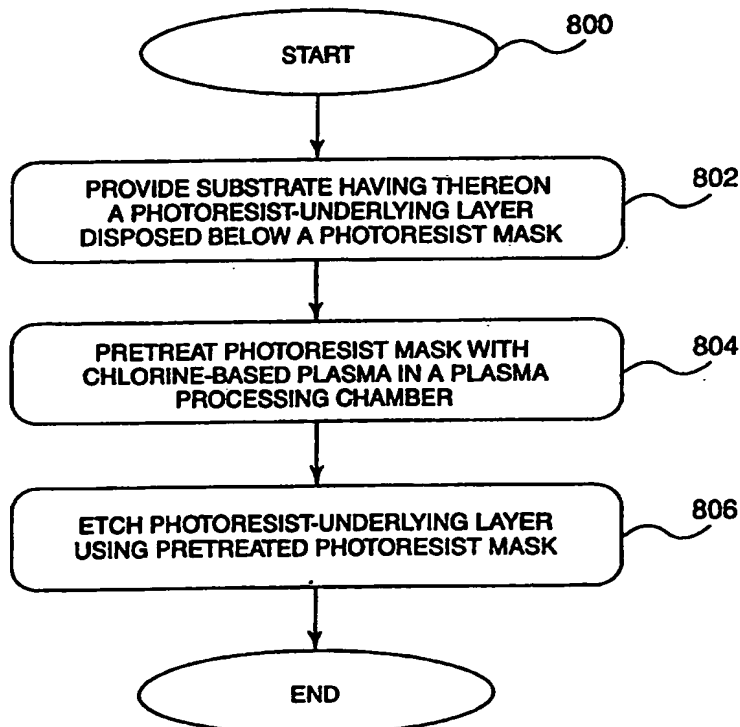
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>6</sup> : <b>H01L 21/027, 21/311, G03F 7/40</b>	<b>A1</b>	(11) International Publication Number: <b>WO 99/33095</b> (43) International Publication Date: <b>1 July 1999 (01.07.99)</b>
(21) International Application Number: <b>PCT/US98/26502</b> (22) International Filing Date: <b>11 December 1998 (11.12.98)</b> (30) Priority Data: 08/997,346                      23 December 1997 (23.12.97)      US (71) Applicant: <b>LAM RESEARCH CORPORATION [US/US];</b> 4650 Cushing Parkway, Fremont, CA 94538-6470 (US). (72) Inventors: <b>HASELDEN, Barbara; 10222 Nile Drive, Cupertino, CA 95014 (US). LEE, John; 3482 Hart Common, Fremont, CA 94538 (US). ARIMA, Chau; 40482 Carmelita Court, Fremont, CA 94538 (US). CHIU, Eddie; 3068 Staples Ranch Drive, Pleasanton, CA 94588 (US).</b> (74) Agents: <b>NGUYEN, Joseph, A. et al.; Beyer &amp; Weaver, LLP, P.O. Box 61059, Palo Alto, CA 94306 (US).</b>		(81) Designated States: <b>JP, KR, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).</b>  Published <i>With international search report.</i>

(54) Title: IMPROVED TECHNIQUES FOR ETCHING WITH A PHOTORESIST MASK

## (57) Abstract

A method for improving profile control during an etch of a nitride layer disposed above a silicon substrate is disclosed. The nitride layer is disposed below a photoresist mask. The method includes positioning the substrate, including the nitride layer and the photoresist mask, in a plasma processing chamber. There is also included flowing a chlorine-containing etchant source gas into the plasma processing chamber. Further, there is included igniting a plasma out of the chlorine-containing etchant source gas to form a chlorine-based plasma within the plasma processing chamber. Additionally, there is included treating, using a chlorine-based plasma, the photoresist mask in the plasma processing chamber. The treatment of the photoresist is configured to etch at least a portion of the photoresist mask and to deposit passivation polymer on vertical sidewalls of the photoresist mask without etching through the nitride layer.



# INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP03/01052

**A. CLASSIFICATION OF SUBJECT MATTER**  
Int.Cl<sup>7</sup> H01L21/3065

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
Int.Cl<sup>7</sup> H01L21/3065

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
Jitsuyo Shinan Koho 1922-1996 Toroku Jitsuyo Shinan Koho 1994-2003  
Kokai Jitsuyo Shinan Koho 1971-2003 Jitsuyo Shinan Toroku Koho 1996-2003

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X, <u>Y</u>	JP 2000-307001 A (Sony Corp.), 02 November, 2000 (02.11.00), Par. Nos. [0028] to [0089] (Family: none)	1, 3-7, 13, 15-19, <u>10</u>
X, <u>Y</u>	JP 2001-127039 A (NEC Corp.), 11 May, 2001 (11.05.01), Par. Nos. [0008] to [0026] (Family: none)	9, 11, 12, <u>10</u>
X	US 2001/0045667 A (Hiroshi YAMAUCHI), 29 November, 2001 (29.11.01), Par. Nos. [0017] to [0072] & JP 2001-308067 A	2, 8, 14, 20

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

\* Special categories of cited documents:  
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"&" document member of the same patent family

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